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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/760,547

01/21/2004

Michael Pedersen

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02/08/2005

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EXAMINER

NGUYEN, LINH V

ART UNIT

PAPER NUMBER

2819

DATE MAILED: 02/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/760,547	Applicant(s) PEDERSEN, MICHAEL	
	Examiner Linh V. Nguyen	Art Unit 2819	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-20, 38 and 39 is/are allowed.
- 6) ☒ Claim(s) 21-29 and 31-37 is/are rejected.
- 7) ☒ Claim(s) 30 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This office action is in response to application 10/760,547 filed on 10/21/04. Claims 1 – 39 are pending on this application.

Priority

2. This application claims benefit of 60/441768 filed on 01/23/2003.

Specification

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 21 – 23, 25, 26, 28, 29, 31 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dent U.S. Patent No. 6,067,363 in view of Fig. 5 [503] of Applicant Admitted Prior Art (AAPA).

Regarding claim 21, Fig. 1 of Dent discloses an electronic circuit for the detection and conversion of a capacitive transducer signal (10) comprising: a frequency modulation block (12); a frequency to bit stream conversion block (30) receiving the output of the frequency modulation block (output of 12); an external capacitor (10) connected to the frequency modulation block (12); and an external digital signal processing unit (31) receiving the output (6-bit phase value) of the frequency to bit stream conversion block (30); whereby a change of capacitance in the external capacitor causes a change in oscillation frequency within the frequency modulation block (this is a intrinsic characteristic of frequency modulation block 12; because the frequency modulation block 12 is receiving the frequency output signal of variable capacitor 10 to generate the oscillation output frequency; therefore, change in capacitance of 10 will changes the oscillation output frequency of 12) and whereby the change in oscillation frequency causes a change in the output bit stream of the frequency to delta-sigma bit stream conversion block (this is a intrinsic characteristic of 30; because the frequency to digital block 30 is receiving the oscillation output frequency of modulator 12 and generating the digitized output bits; therefore, change in the frequency oscillation output will changes in the digitized output bits of 30). However, Dent fails to disclose the frequency to bit stream Fig. 1[30] is a frequency to delta-sigma bit stream.

Fig. 5 [503] of AAPA discloses a frequency to delta-sigma bit stream.

Dent and AAPA is a common subject matter for converting frequency to bits stream. Therefore, it would have been obvious to one having ordinary skill in

Art Unit: 2819

the art at the time the invention was made to incorporated the frequency to delta-sigma bits stream taught by AAPA into the frequency to bits stream of Dent et al. for the purpose of one to shift noise sources out of the frequency band of interest as suggest by AAPA on lines 8 – 11 of Page1, under Background, of applicant's disclosure.

Regarding claim 22, Fig. 1 of Dent modified by AAPA, as applied to claim 21 above, further discloses wherein the external capacitor is a continuously variable capacitor (Fig. 1[10]).

Regarding claim 23, Fig. 1 of Dent modified by AAPA, as applied to claim 21 above, further discloses wherein the frequency modulation block (12) is an oscillator (Oscillator), and wherein the external capacitor (10) controls the oscillation frequency.

Regarding claim 25, Fig. 1 [30] of Dent modified by Fig. 5 [503] as applied to claim 21 above, disclosed wherein the frequency to delta-sigma bit stream conversion block is a frequency delta-sigma modulator (AAPA, Under Background, line 23 of page 4 of applicant's disclosure).

Regarding claim 26, Fig. 1 [30] of Dent modified by AAPA, as applied to claim 25 above, further discloses wherein the frequency to delta-sigma modulator uses modulo-2 arithmetic (Dent, Col. 3 line 57 – 59).

Regarding claim 28, Fig. 1 [30] of Dent modified by AAPA, as applied to claim 21 above, further an internal oscillator (Fig. 1 [Oscillator 12] for sampling.

Regarding claim 29, Fig. 1 [30] of Dent modified by AAPA, as applied to claim 21 above, further discloses wherein the frequency to delta- sigma bit

Art Unit: 2819

stream conversion block requires an external signal (Fig. 1 [Reference Clock Input]) for sampling (Col. 1 lines 32 – 35).

Regarding claim 31, Fig. 1 [30] of Dent modified by AAPA, as applied to claim 21 above, further discloses wherein the external digital signal processing unit (Fig. 1 [31]) includes facilities for decimation and filtering (Col. 4 lines 5 – 7) of the bit stream (Fig. 1 [Output 6-bit phase Values]) from the frequency to delta-sigma bit stream conversion block (Fig. 1[30]).

Regarding claims 32 and 34, Fig. 1 [30] of Dent modified by AAPA, as applied to claim 21 above, fails to disclose: using bond pads for wiring the frequency modulation 12 and the variable capacitor 12, and for wiring the delta-sigma 30 and the external digital process unit 31. However, It would have been obvious to having ordinary skill in the art at the time the invention was made to using bond pads for wiring between electronics devices, since it was known in the art that bond pads for wiring is a common knowledge for interface between electronic devices of an integrated circuit.

6. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dent modified by AAPA as applied to claim 21 above, and further in view of Hovin et al. U.S. Patent No. 6,362,769.

Dent modified by AAPA as applied to claim 21 above, fails to disclose the oscillator frequency modulator 12 is a ring oscillator.

Fig. 7 of Hovin et al. discloses an Analog to Digital converter with frequency modulator (Col. 7 lines 36 – 38); wherein the frequency modulator implemented by ring oscillator (Col. 7 lines 38 – 40).

Dent and Hovin et al. are common subject matter for frequency to digital converter. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the oscillator of frequency modulator of Dent with the ring oscillator of frequency modulator taught by Hovin et al. for the purpose of improve on the “count and dump” of frequency to digital converter (Hovin et al, Col. 1 lines 48 – 60).

7. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dent modified by AAPA as applied to claim 25 above, and further in view of LeReverend et al. U.S. Patent No. 6,697,000.

Dent modified by AAPA as applied to claim 25 above, fails to disclose wherein delta-sigma modulator has an order of one or higher.

Fig. 3, LeReverend et al. discloses a delta-sigma modulator has an order of one or higher (Col. 3 lines 46 – 49).

Dent modified by AAPA and LeReverend et al. are common subject matter for audio application with delta-sigma modulator. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporated the one or higher order delta-sigma taught by LeReverend et al. into the delta-sigma of Dent for the purpose quantization noise reduction and eased analog circuitry benefits of oversampling ADC's with the benefit of noise

Art Unit: 2819

shaping to achieve a high resolution ADC (LeReverend et al., Col. 1 lines 27 – 33).

8. Claims 33 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dent modified by AAPA as applied to claim 21 above, and further in view of Gallow U.S. Patent No. 6,188,342.

Fig. 1 [30] of Dent modified by AAPA, as applied to claim 21 above, fails to disclose using monolithic integration for: connected the frequency modulation 12 with the variable capacitor 12, and connected the delta-sigma 30 with the external digital process unit 31.

On Col. 6 lines 41 – 46, Gallow teaches using monolithic integration for connecting all electrical components.

Dent modified by AAPA and Gallow et al. are common subject matter for analog to digital converter. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to implement the monolithic integration taught by Gallow into Dent for the purpose of providing a single device integration greatly simplifies the manufacturing and packaging and promotes better device reliability (Gallow, Col. 6 lines 46 - 48).

9. Claims 36 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dent modified by AAPA as applied to claim 21 above, and further in view of Scott et al. U.S. Patent No. 6,330,330.

Fig. 1 of Dent modified by AAPA, as applied to claim 21 above, fails to disclose the frequency modulator 12, Sigma-delta modulator 30, and external digital processing unit are implemented by CMOS components.

Fig. 2 of Scott et al. discloses frequency oscillation modulator 202, a Sigma delta modulator and an external digital process unit 213 are implemented by CMOS components (Col. 5 lines 7 – 17).

Dent modified by AAPA and Scott et al. are common subject matter sigma-delta modulator, frequency modulator, and digital process unit. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to implement the modulators and digital process unit of Dent with the CMOS technology taught by Scott et al. because CMOS technology is allows a high level of integration to interface with other communication devices (Scott et al. Col. 4 line 65 – Col. 5 line 1).

Allowable Subject Matter

10. Claim 30 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The Prior art fails to teach the external signal for sampling is provided by the external digital processing unit.

11. Claims 1 – 20, and 38 – 39 are allowed.

Art Unit: 2819

12. The following is an examiner's statement of reasons for allowance:

With respect to claims 1, 38 and 39, in addition to other elements in each respective claim, the prior art fails to teach or suggest a converter for converting a transducer signal having the first circuit to convert a transducer signal to a digital signal and a second circuit for receiving the digital signal from the first circuit and generating a delta-sigma bit stream.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Cited References

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The cited references are relating Analog-to-digital converter.

Contact Information

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Linh Van Nguyen whose telephone number is (571) 272-1810. The examiner can normally be reached from 8:30 – 5:00 Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the

Art Unit: 2819

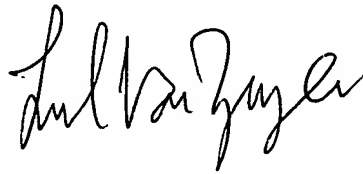
examiner's supervisor, Mr. Michael Tokar can be reached at (571) 272-1812.

The fax phone numbers for the organization where this application or proceeding is assigned are (703-872-9306) for regular communications and (703-872-9306) for After Final communications.

01/31/05

Linh Van Nguyen

Art Unit 2819

A handwritten signature in black ink, appearing to read 'Linh Van Nguyen', written in a cursive style.